

# Gone With the Wind

**How California Is Losing Its Clean Power Edge to ... Texas??!**



By Peter Asmus  
Pathfinder Communications

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## GONE WITH THE WIND

**D**enny Beeson is a long-time veteran of California's wind power industry. As current president of the Tehachapi/Mojave Wind Park, Beeson has been preaching the gospel on wind power for fifteen years.

So when the California Power Authority (CPA), a new state agency created in response to the energy supply crisis of 2001, put out the word that it might develop as much as 1,500 MW of new renewable energy capacity this year<sup>1</sup>, Beeson's eyes lit up and he pulled out pencil and paper.

He put together a bid for a 50 MW project consisting of 69 wind turbines that were 1.5 MW in size and would operate 40 percent of the time. He thought for sure that he had a winning bid. After all, California's existing fleet of wind turbines only operates 23 percent of the time because so much of what was developed in the 1980s is old, primitive technology<sup>2</sup>. He was employing American-made wind turbines that were considered the state-of-the-art. He had an excellent site in the Altamont Pass, featuring some of the state's best wind resources, and the project could have been completed within a matter of months.

"I'm just a little guy, but everybody I knew in the wind industry was trying to make the project work – Enron (now GE Wind), enXco, Toman. The list of heavyweights goes on and on," recalls Beeson, referring to firms deeply involved in the wind power business in California. "My initial price was 5.8 cents per kilowatt hour (kWh). Then they whittled it down to 5.4 cents/kWh, and then under 5 cents/kWh. My price came in below the benchmark prices they had for a natural-gas fired power plant. The negotiator, who I happen to know had a history of hating wind power, kept telling me: 'I can get you a contract.' In the end, nothing." Beeson is not alone in his frustration trying to develop new renewable energy projects in California.

California was held up as a role model on energy policy throughout the world for decades beginning in the 1970s, when the state came up with the novel idea that reducing energy consumption could stave off the building of nuclear power plants up and down the coastline of the state. Unlike other states, California banned oil as a fuel for electricity generation and halted construction of coal-fired power plants due to concerns about air pollution during the same decade. Yet the state's real claim to fame came in the 1980s, when California literally gave birth to the world's renewable energy industry. In the course of just five years, a combination of tax credits, long-term power purchase contracts and state technical assistance jumpstarted the wind, solar, geothermal and biomass power industries.

In the 1990s, things started to unravel. Leading renewable energy companies such as Kenetech of Livermore, California, the world's largest wind power company, went belly-up due, in large part, to California's unstable power market conditions. A planning process for new power plants that was supposed by to be "biennial" dragged out for eight years – and then was overturned by federal regulators. Some 1,458 megawatts of planned new supply, including approximately 500 MW of new wind and geothermal capacity, was never put into the ground.

In the 21<sup>st</sup> century, California's business climate for the cutting edge energy technologies of tomorrow has deteriorated to the point where many of the nation's leading clean power companies – a few still based here -- have all but thrown in the towel. During the last two years, when California needed renewable energy more than any other time in its history to avoid rolling blackouts and high-priced wholesale spot power purchases, very little new renewable energy capacity came on-line.

More than 30 contracts with wholesalers worth \$40 billion represent California's current response to future supply shortages. Roughly 70 percent of these contracts sell power from facilities that have not yet been built.<sup>3</sup> All but 2.5 percent – 120 MW -- of new electricity generators are fueled by natural gas, a fuel that is subject to supply constraints and rapid, extreme price fluctuation. When natural gas prices go up, the cost of electricity increases dramatically. Experience has shown us that it is never good to depend primarily on a single fuel to generate electricity. As in an investment portfolio, diversity is necessary to hedge against risks.

Perhaps the most striking example of how California has failed to keep pace with new technological developments on cutting edge clean power sources is wind power, the world's fastest growing source of electricity on a percentage basis<sup>4</sup>. Once home to 90 percent of the world's wind power -- because of 1,700 MW that has been on-line since the mid-80s -- California's share has slipped to just 10 percent over the last decade or so.

All told, the US as of last year has accumulated 4,261 MW of utility-scale wind turbines in 26 states. "2001 was an astounding year for our industry in the US," commented Randy Swisher, executive director of the American Wind Energy Association (AWEA). "More wind generation was installed in a single state – Texas (915 MW) – than had ever been installed in the entire country in a single year. We are finally beginning to tap into wind energy's enormous potential."

Though 410 MW of new wind power was authorized to come on-line in California during the summer of 2001<sup>5</sup>, when rolling blackouts hit, none of this new clean power was actually installed due to the increasingly Byzantine nature of California's chaotic approach to governing power markets. All told, 1,300 MW of new renewable power supply has been authorized over the last two years with \$241 million

in state financial incentives provided by the California Energy Commission. Only 201 MW is actually in operation today<sup>6</sup> (and most of these are upgrades or repowers to existing wind farms).

In short, a combination of a deeply flawed power market, and a lack of clear and compelling political leadership over the last two decades, has cost California billions of dollars in wholesale power costs due to the collapse of the state's once robust market for renewable energy and other clean power technologies.

Steve Ponder, director of regulatory affairs for FPL Energy, Inc., the firm that proposed to build most of the 410 MW of wind power last year, complains that

*"What we need today are power purchase agreements either with the state or with utilities so that we can finance long-term contracts and bring the price down."*

Ed Maddox, SeaWest

"California has become one of the most difficult power markets to develop wind projects from a financial point of view because of a lack of regulatory stability. Who is in charge?" Robert Gates, senior vice president

of GE Wind of Tehachapi, California, concurs. "Doing business in California is very, very difficult. We still don't have any standard power purchasing contracts on the table," he lamented. Gates' former employer, Enron Wind, has 113 MW of new wind projects on hold due to the uncertainty in California's dysfunctional power market<sup>8</sup>. "At present, there is no government guidance on power purchases, so we are just burning more gas, setting ourselves up for future spikes in price when gas prices go up again. We also need a stable buyer that the rest of the world believes will pay for new wind power."

Ed Maddox, vice president of business development for San Diego-based SeaWest, another wind developer, added: "The restructuring of California's electricity market certainly created a new environment in which to do business in California. But this new business environment included a number of barriers. What we need today are power purchase agreements either with the state or with

utilities so that we can finance long-term contracts and bring the price down<sup>9</sup>.”

The story is much the same for the other renewable energy technologies that offer stable, predictable prices without the air emissions that contribute to urban smog and global climate change.

Meanwhile, at least a dozen other states have enacted a Renewable Portfolio Standard (RPS), a market-based mechanism that gradually increases the portion of electricity produced from renewable resources<sup>10</sup>.

Among the most notable states is Texas. A state deregulation law signed by former Texas governor George W. Bush included an RPS that called for bringing 400 MW of renewable energy on-line by the end of the 2001. Instead, Texas companies added more than twice that amount, more than half of the nation’s total new wind power capacity.

California’s deregulation law, which did not include an RPS, has fostered little growth in renewable energy supply over the last five years.

The Texas RPS, which has been hailed as the most effective in the country, calls for adding 2,000 megawatts of new renewables to the state’s grid by 2009. Thus far, wind power has captured 90 percent of this new market. Enron Corp. and Reliant Energy Inc., two companies vilified in California due to their alleged price-gouging on wholesale fossil fuel supply, tacitly admitted that wind power is one of the cheapest ways to generate electricity in their home

state of Texas. Both firms voluntarily exceeded the RPS targets, citing the volatility and state’s reliance upon natural gas as the state’s primary electricity generation fuel.

Interestingly enough, one of the wind power projects developed under the RPS is located near President Bush’s boyhood home of Midland in Upton County. The 278 King Mountain wind farm is among the largest in the world and sells its output to Reliant Resources, Inc. under a 15-year power purchase contract. “We’ve always had a good understanding

that you need to diversify your energy sources,” commented Charles Jenkins, vice president of Dallas-based TXU Corp., one of the state’s utilities purchasing wind power to

*“We’ve always had a good understanding that you need to diversify your energy sources.”*

Charles Jenkins, TXU Corp.

meet the RPS mandate<sup>11</sup>.

New York State has a new RPS requirement that 6 percent of all new electricity production come from renewable resources as part of its statewide effort to reduce emissions contributing to global climate change<sup>12</sup>. It is the economic development potential that has also boosted interest in renewable energy and other clean power technologies in the Pacific Northwest. A study by Climate Solutions, a Seattle-based non-profit dedicated to stopping global climate change, has projected that clean energy technologies could expand from a current \$1.4 billion industry employing 6,000 people into a \$4 billion industry employing 32,000 people within the next two decades.

## WIND POWER: A CASE STUDY

Perhaps the clearest sign that California has relinquished its leadership role in promoting clean power technologies is the unfolding story of wind power. The world wind market used to be dominated by California companies. A short history lesson highlights how far California has slipped when it comes to pushing the envelope on promoting new renewable energy sources.

The passage of the federal Public Utility Regulatory Policy Act (PURPA) in 1978 allowed for private companies to build new power plants relying upon renewable fuels. California was the most aggressive state when it came to implementing PURPA. Among the incentives offered for wind power developers were generous state investment tax credits (which augmented federal tax credits), standard long-term utility power purchase contracts that featured fixed prices during the first 5 to 10-years of operation, and a state-funded wind resource assessment that identified California's best wind energy opportunities.

Approximately \$1 billion was diverted from federal and state taxes into wind farms between 1981 and 1985 to jump-start the world's wind power industry in California. The end result of this effort was the addition of 1,700 MW of new wind power capacity to the state's power plant portfolio.

Both federal and state investment tax credits were terminated in 1986 due to publicity surrounding the abuse of this investment tax shelter. Congressman Pete Stark of Hayward led the fight to terminate the investment tax credits by proclaiming, "these aren't wind farms, they're tax farms." Yet California's public policies created a global market for wind as well as other renewable energy technologies<sup>13</sup>.

The various federal and state financial incentives played a critical role in attracting almost \$2 billion in private capital (some of which came from foreign investors) to develop wind farms in California in less

than five years<sup>14</sup>. Because of the investment tax credits, wind turbine technology achieved the maturity in five years that typically takes 15 to 30 years in secluded government labs, argued proponents of these financial incentives. Ed DeMeo, former Electric Power Research Institute (EPRI) manager of renewable energy programs, notes that the use of tax credits was "far more effective than the federal wind R&D program. Though not perfect, the credits helped improve the technology bit by bit."

Between 1974 and 1990, U.S. taxpayers invested \$450 million in research and development funding through the federal Department of Energy effort to develop a 1 MW or bigger wind turbine that would appeal to utility monopolies. Not one commercially viable machine emerged from the U.S. federal government's forays into developing a wind turbine.

Ironically, Denmark benefited more than anyone else from California's renewable energy program. In 1985, 67 percent of the wind turbines installed in California were manufactured in the US. By 1999, these percentages had reversed themselves as 65 percent of the wind turbines operating in California were manufactured overseas<sup>15</sup>. Today, 90 percent of the world's wind turbine manufacturers are based in Europe, with Denmark remaining the world's dominant supplier of wind turbines<sup>16</sup>. GE Wind, formerly Enron Wind Corp., is the only major US wind turbine manufacturer to survive the 1990s. And its new turbines are largely based on designs of the German firm Tacke, which was purchased by Enron in 1999.

Last year, the domestic wind power industry had its best year ever, installing 1,695 MW of new wind power capacity in 16 different states<sup>17</sup>. Coincidentally, that number is about the same amount of wind power that California has had on-line, with virtually no change, over the past decade. Only 69 MW was added in California last year<sup>18</sup>.

## Old Wind Project “Repowers” Also Stalling

Even proposals to change out old, inefficient wind turbines with new, modern state-of-the-art turbines consistently run into roadblocks in California, according to John Johansen, a president of Global Renewable Energy Partners of San Diego. His firm, a development arm of NEG-Micon, a Danish wind turbine manufacturer, has been trying to re-power a 109 MW wind farm in the Altamont Pass for over two years.

The initial obstacle to moving forward was the insolvency of PG&E. But PG&E has further contributed to delays because it has refused to sign a contract amendment that developers need in order to take advantage of a federal wind production tax credit. “California utilities lobbied hard for this provision in Congress. In exchange for receiving the federal production tax

credit, wind project developers holding existing power purchase contracts with California utilities have to relinquish any capacity payments over and above historical levels of production,” said Johansen.

California utilities argued that repowered projects should not be able to take advantage of both the federal tax credit and any increase in capacity payments pegged to increased power production from turbine change outs.



1980's era wind turbines in Altamont Pass.

To his knowledge, no utility in California has authorized such contract amendments, even though they were the ones who stipulated that such contract amendments were necessary to limit subsidies to California wind projects. “No politician has taken a position on this issue. We would be taking out eight turbines for every one we put in. The county would love us because we would be reducing clutter. The environmentalists would love us too, because we could reduce avian mortality. But we can’t attract any attention to the issue. So nothing happens because the utilities just refuse to sign the contract amendments.”



## Texas: New Clean Energy Leader?

Given recent announcements by TXU Energy and Cielo Wind Power regarding a new 240 MW wind farm, and other projects proposed in Texas, the Lone Star State could actually surpass California in total wind capacity within the next few years<sup>19</sup>.

There are many folks working hard to make Texas a global leader on wind power. Among them is Chris Crow, who has been riding the Texas wind boom for all it is worth.

Crow has been in the real estate business for over 30 years. He has also dabbled with work in the petroleum business. It wasn't until 1993, when the real estate market in Texas was the pits, that he was hired by a California wind farm developer to poke around West Texas and find some sites suitable for new wind farms.

"I knew nothing about wind power," acknowledges Crow. "All I knew is that the wind blew hard in much of West Texas."

Crow's job was to secure sites. "I drove all around West Texas, eyeballing sites, looking at topographical maps and researching what little data I could find about wind speeds," said Crow. Once he found the most promising sites, he looked up landowners and went knocking on doors.

"Most of these folks had been worked over by the oil industry for the past 30 to 50 years, so these folks were no dummies. I tried to get the land cheap, but all they ever said was, 'cash, give me more cash.'"

His first success came when he informed a children's home that they owned an excellent site for a new wind farm. "They had never even looked at the property," Crow reminisced. "I gave them a tour of



New wind farms in West Texas.

their own land!" he chuckled. His second client was a wind power enthusiast who managed a barbed wire museum called "Devil's Rope" and who also happened to manage the infamous Route 66 museum.

"I've signed up about 12,000 to 15,000 acres of land that could produce about 1,000 MW of wind power," bragged Crow. "When I first got into the wind business, I was just trying to survive," he admitted. "So far, I guess you could say things are going pretty well."

The *Houston Chronicle* had this to say about the transformation of the small "oil-patch" town of McCamey, into a center of wind power development in West Texas:

*"Virtually every flat-topped mesa visible from the center of town bristles with tall, graceful turbines. Entrepreneurs from Austin are regular visitors, doing multimillion-dollar deals with local landowners. Hard-hatted executives from major national utility companies pop in for hamburgers at the Dairy Queen. Danish technicians have braved rattlesnakes to install turbines, and some have even found love among the locals."*

More than \$1 billion of new wind development has blessed West Texas; \$800 million of that total is concentrated around McCamey<sup>20</sup>. Much of the appeal of wind power in Texas, and throughout the Great Plains, is good high-paying jobs and the payment of wind royalties to those who own the land upon which the wind turbines are sited. Wind royalties are paid out to landowners at a rate of between 2 to 5 percent of the annual gross profits. This is often enough extra income for farmers and ranchers to continue their traditional lifestyle. Because wind turbines only take up 5 percent of the land, the landowners can continue to grow crops or graze animals.

New companies such as Suzlon, an East Indian wind turbine manufacturer currently working with Native Americans on a pilot wind power project, has set up an office in Houston, Texas. Renewable Energy Systems, a UK developer very active in the current Texas wind power boom as well as internationally, has also established an office in Austin, Texas. Both firms moved to Texas because the RPS has created a clear, long-term market for wind power.

Even more impressive are the following companies and jobs all based in Texas and now benefiting from the wind boom: 325 jobs with Lone Star Transportation of Fort Worth, the top freight hauler of wind power plant components; 300 jobs at Trinity Structural Towers of Dallas-Fort Worth, nation's leading manufacturer of wind turbine towers; 200

jobs at Gainesville's Molded Fiber Glass, a firm that produces blades and other composite components for wind projects; 120 jobs at El Paso-based Bergen Southwest Steel, a major wind tower fabricator.

According to Jim Caldwell, policy director for the American Wind Energy Association (AWEA), sensible nondiscriminatory transmission policies that do not penalize variable resources such as wind power also had a major impact on growing the Texas wind power market so quickly.

"Texas devised a good straightforward pricing system for allocating transmission capacity to wind developers," said Caldwell. Having worked in California, Caldwell noted that there was a very different attitude between utilities in California and utilities in Texas. "There are all kinds of transmission constraints in West Texas. Hell, the utilities never had to worry much about building transmission capacity out there because nobody wants to live out there because of the damn wind! But when we sit down with the utilities, they have a can do attitude. They want to help out and help build new transmission capacity that will help build the market for wind. In California, the utilities can get away with doing nothing. In the current political and regulatory environment, they have no incentive to be accommodating to wind or other renewable energy technologies."

## The Pacific Northwest and Midwest

**A**long with Texas, the other two major wind power boom regions are the Pacific Northwest and the Midwest. Both of these regions could overtake California in terms of total wind capacity over the next several years.

The Bonneville Power Administration (BPA), a federal agency based in Portland, Ore., released a Request For Proposal for 1,000 MW of new wind power capacity in May 2001. BPA received proposals from developers totaling 2,600 MW, which far exceeded expectations.<sup>21</sup> The Danish firm Vestas is moving its Tehachapi office operations to Portland, or another city in the Pacific Northwest, to be part of a 700,000 square foot new manufacturing factory that will employ as many as 1, 000 people. Vestas chose the Pacific Northwest because they see a booming wind power market there, according to Rachel Shimshak, director of the Renewable Northwest Project. "Our policies here to encourage renewables are not that much different than California's. The difference is that we have clearly interested buyers in BPA and PacificCorp Power Marketing. Where there is demand with market makers like these willing to purchase renewable energy supply, the developers will come," she said.

Massive wind projects are being proposed in the Upper Midwest. For example, James Dehlsen, America's most successful wind power entrepreneur, has proposed the world's largest wind farm in South Dakota. Dehlsen founded Zond Systems, Inc. with money he made in the stock market. He purchased 750 acres of land in the Tehachapi Mountains in 1980. By 1997, Zond had emerged as America's largest wind company and was purchased by Enron. Dehlsen walked away with \$40

million, quite a feat considering most of his rivals in the US went belly-up.

Today, Dehlsen is CEO of his own Santa Barbara-based Wind Clipper LLC. His new dream, a 3,000 MW wind farm, has been dubbed "Rolling Thunder." Perhaps the most interesting new twist to this proposal is the construction of a private transmission line that would bring wind power generated in the desolate hills of South Dakota, some 650 miles east to the "Windy City" of Chicago. Rolling Thunder will generate the same amount of electricity as burning 3.5 million tons of coal, the dirtiest of all fossil fuels and a prime contributor to global climate change. The Rolling Thunder project could be completed by 2006 and generate electricity for costs as low as 2.6 cents per kilowatt hour if the federal wind production tax credit of 1.7 cents per kilowatt hour is included in the pricing.

While Rolling Thunder may represent a new era in wind power, it has quite a few hurdles to jump before it becomes a reality. Minnesota is the current wind power leader in the Midwest, committing itself to over 825 MW of wind power. In 1998, the Minnesota Department of Public Service deemed wind power the least-cost generating resource and added 400 MW of wind to an existing commitment to 425 MW of wind power<sup>22</sup>. It is firm commitments such as this that

attract new factories and jobs to the Upper Midwest.

LM Glasfiber, a Danish blade manufacturer, opened a manufacturing facility in North Dakota in 1999<sup>23</sup>. And NEG Micon, the Danish wind turbine manufacturer, also opened up a manufacturing

facility in Champaign, Illinois. On top of that, Gamesa Eolica, a leading Spanish wind turbine manufacturer, is considering building a huge manufacturing facility in the Midwest to support the

*"Where there is demand with market makers like these (BPA and PacificCorp Power Marketing) willing to purchase renewable energy supply, the developers will come."*

Rachel Shimshak,  
Renewable Northwest Project

company's internal goal of putting 1,000 MW of new wind power in the ground throughout the Midwest<sup>24</sup>.

Globally, the numbers on wind power are even more impressive. Some 6,500 MW of new wind power capacity was added in 2001, three times the amount of new nuclear power capacity to come on line last

year<sup>25</sup>. This was also a new record and the third year in a row that new wind capacity has beat new nuclear capacity. Total global capacity for wind power now stands at 24,000 MW, a 37 percent increase over 2000. By 2020, wind power could provide 10 percent of the world's electricity while providing 1.7 million jobs<sup>26</sup>.

## Corporate Heavyweights Enter Wind Power Industry

Perhaps the clearest sign that the wind industry has moved beyond the boom and bust cycles of the past is the long list of corporate heavy weights, including Japanese firms such as Mitsubishi, now investing in the technology<sup>27</sup>.

GE Power Systems, which first explored opportunities with wind power in the 1970's, purchased the manufacturing facilities of Enron Wind Corp., the largest remaining wind turbine manufacturer in the country. Interesting enough, Enron Wind Corp. was one of the only profitable lines of business in Enron's web of companies, growing from \$50 million per year in 1997, when Enron purchased Zond Systems, Inc., to \$750 million last year<sup>28</sup>.



"The acquisition of Enron Wind represents GE Power Systems' initial investment into renewable power, one of the fastest growing energy sectors," said John Rice, the new president and CEO of GE Power Systems.

FPL Energy, a subsidiary of Florida Power & Light, is the nation's leader on wind energy. The company owns or operates 24 wind farms in California, Iowa, Kansas, Minnesota, Oregon Washington and Wisconsin. During 2001, FPL Energy added 844 MW of wind generation to its portfolio. The company now operates 1,830 MW of wind power capacity. The company owns 1,439 MW or 38 percent of the total US wind power market.

Oil companies are also diversifying into wind power. Shell WindEnergy, Inc. purchased an 80 MW wind plant in Texas this past January. The company also owns a 41 MW project in southern California and a 50 MW wind farm in Wyoming. A relatively new player in wind markets, Shell WindEnergy is developing or operating more than 1,000 MW of wind in the US and Europe.



BP and Chevron Texaco announced this past January that the two firms would build and operate a 22.5 MW wind power plant at their jointly-owned Nerefco oil refinery near Rotterdam in the Netherlands. "This project is an excellent opportunity in line with BP's strategy to add value to our business, lower emissions and demonstrate our commitment to clean energy," commented Bob Dudley, BP's group vice president, Gas and Power and Renewables.



## CALIFORNIA'S OTHER RENEWABLE ENERGY RESOURCES

The story with California's other renewable energy resources is not as dramatic as the wind power story, yet many common themes appear. In each case, California made huge leaps and bounds in the '80s and early '90s, only to become bogged down in regulatory red tape and indifference on the part of often well-meaning policy makers. Over the years, a disconnect between public desires for cleaner power sources and the actual fuels being used in new power generation facilities has become increasingly apparent.

### **Geothermal Power**

In 1957, the Kent Imperial Company of Grand Rapids, Michigan showed up at the Sinclair Ranch in the Imperial Valley of California. They had one thing in mind: oil. The well they drilled instead only found an enormous basin of volcanically heated water. This discovery of the Salton Sea geothermal field launched a whole new industry in California.

The approximately 478 MW of geothermal capacity currently operating in Imperial County contributes roughly a quarter of the county's total tax base. Geothermal developer Cal Energy, a subsidiary of MidAmerican Energy Holdings, is Imperial County's single largest taxpayer.

California can boast that it has the world's largest known geothermal resource area. In operation since 1960, The Geysers, located in Sonoma and Lake counties, can generate up to 1,000 MW of electricity, the equivalent of a large nuclear reactor and enough to power all of San Francisco. Because the capital costs of these facilities have already been paid off, this geothermal capacity is among the lowest cost electricity sources in the state.

California still leads the rest of the nation when it comes to geothermal steam technologies. At present, California has about 1,753 MW of installed

geothermal plants, ranging in size from under 1 MW to 110 MW, providing roughly 5 percent of California's total electricity. Total US capacity stands at roughly 2,800 MW. Repowering of some plants is planned at The Geysers, which remains the largest steam field in the world, but most new geothermal power plant capacity in California will be using the more common hot water reservoirs in other parts of the state.

*"You would have a hard time convincing Wall Street to put their money into a renewable energy project in California at this point in time."*

Kent Robertson, Calpine

Calpine -- one of the nation's leading power plant developers -- owns and operates the Geysers. According to Kent Robertson, director of corporate communications

for Calpine, the current conditions in the California market make it difficult to site and finance any new power plant, period. But new renewable energy facilities are particularly difficult in these uncertain times. Calpine has been trying to develop two 49 MW projects in Siskiyou County over the past few years. Even the "Four Mile Hill" project, which has a power purchase contract with the Bonneville Power Administration, is struggling to obtain financing. The second project, known as a "Telephone Flat," has been opposed by the US Forest Service and has yet to move beyond the exploratory drilling phase.

“You would have a hard time convincing Wall Street to put their money into a renewable energy project in California at this point in time,” said Robertson. “To succeed in California today, one has to have the financial wherewithal, and the fortitude, to deal with such an uncertain market. If power buyers did have to add X amount of renewables to their supply – we could create a market for clean power in California. Right now, the state’s Department of Water Resources (DWR) is the state’s power buyer. But that may be only temporary. What is going to happen with the power purchase contracts DWR has signed, many of them, by the way, with Calpine for gas-fired power? How much uncertainty can developers stomach? How much can your banker stomach?”

Cal Energy, a subsidiary of Mid-American Energy, recently submitted a proposal to construct a geothermal project up to 200 MW adjoining its existing facilities at the Salton Sea. Jonathan Weisgall, vice president of legislative and regulatory affairs for the firm, noted that plans for this expansion date back to 1995. “We finally found a credit-worthy buyer in the Imperial Irrigation District,” noted Weisgall. Several hurdles remain, he

*“We want to invest \$400 million in a community with some of the highest unemployment statistics in the state.”*

Jonathan Weisgall,  
Mid-American Energy

noted. Among them is an amendment to state legislation -- SB 530 – that would change current policy at the California Energy Commission, which offers financial incentives for developers to build new clean power supply. The new amendment, offered by Southern California Edison, would disallow these incentives for projects selling electricity to irrigation districts and other public power entities. Weisgall noted that this amendment would reverse state policy guiding renewable energy development over the last six and a half years. “We want to invest \$400 million

in a community with some of the highest unemployment statistics in the state,” said Weisgall, but several hurdles, including the Edison amendment, still stand in the way.

Though geothermal development has stagnated in California, Nevada

last year adopted a RPS of 15 percent by 2013 based largely on the economic development benefits that would flow from developing up to 2,000 MW of geothermal power and an equal amount of wind power. At present, Nevada receives roughly 4 percent of its electricity from hydro and geothermal facilities. The Nevada RPS could stimulate a \$3 billion investment into the Nevada economy<sup>29</sup>.

## **Solar Thermal Power**

California was also a pioneer in solar thermal electric systems known as “parabolic troughs.” At present, nine distinct solar thermal trough systems generate 354 MW of peak power in smoggy Southern California. A total of 650,000 parabolic mirrors stretch over one thousand acres of the desolate Mojave Desert. Originally developed by an Israeli-US joint venture beginning in 1983, expansion plans at the site have been on hold for years despite the fact that the performance of solar thermal parabolic troughs has been excellent, even after 10 years of operation.

The solar thermal parabolic trough technology has been licensed to Duke Solar, a subsidiary of the North

Carolina private utility and a major national power marketer. Despite the access to capital from a large corporate parent, no sales of solar thermal projects in California have occurred in more than a decade.

“I have a few potential projects limping along,” said John Schaefer, project manager for Duke Solar in California. Though the California Energy Commission offers a buy-down rebate that can cover almost half of initial installation costs for solar thermal technologies, not one project has come on-line since these rebates were first made available in 1997. Duke Solar sells units as small as 1 MW. Schaefer acknowledged, nonetheless, that the

technology works best in utility-scale applications in the 50 to 80 MW range. "To get projects off the ground at that scale, one has to aggregate an awful lot of customers. In California, utilities are not buying power. They're allegedly broke anyways. So it is very difficult to market solar thermal projects that make economic sense."

The Sacramento Municipal Utility District (SMUD) has explored solar thermal applications as far back as 1990 when the utility was looking to displace the output from the shuttered Rancho Seco nuclear reactor. Proposals have sought to marry the solar thermal technology to the existing infrastructure at the Rancho Seco site. As recently as a few years ago, Duke Solar submitted proposals to SMUD. "I think all of my proposals just end up in the waste basket," lamented Schaefer.

Commenting on the dynamics of California's current power market, Schaefer observed: "Uncertainty really kills project development work. And bureaucracies understand that well. The uncertainty that exists in California just trashes the whole new power



Parabolic troughs turn sunlight into power for Southern California.

development process." He went on to say that his hopes were raised when the former general manager of SMUD and the Los Angeles Department of Water and Power David Freeman promised a major renewable energy development program through the newly created California Power Authority (CPA). "The CPUC wouldn't let the CPA set the price for these new renewable energy facilities. If the CPA can't set the price, it cannot issue the bonds. So that whole program also fell apart due to bureaucratic bumbling," said Schaefer.



## **Biomass**

Biomass energy is energy from plants, and things derived from plants. In California, the majority of biomass fuel is urban wood waste, agricultural wastes, forest trimmings and methane gas created by organic materials in landfills.

At the turn of the century, small lumber towns like Scotia in Del Norte County were completely powered by wood-fired plants that also provided steam and mechanical power to lumber mills. The nation's first stand-alone biomass power plant was built in the small town of Burney.

California remains the nation's top producer of electricity from biomass with approximately 680 MW of capacity currently on-line. Of the 62 biomass power plants built in the '80s, about 35 are operable today. At the industry's peak, 45 power plants were on-line generating electricity. Roughly a quarter of the state's biomass capacity shut down in 1998 due to high operating costs related to fuel collection and the plummeting prices paid for electricity during the early phase of California's restructured power market. At its peak in the mid-90s, the biomass industry diverted 9.7 million tons of solid urban wood waste from California's crowded landfills. That figure has declined to 6 or 7 million tons of solid wood waste today<sup>30</sup>. As of 2001, 130 MW of the state's biomass capacity remained idle<sup>31</sup>. These facilities also reduce open field burning of agricultural wastes. When burned in a biomass power plant instead of an open field, emissions that contribute to respiratory diseases are reduced by 98 percent.

Of the 680 MW currently operating, roughly 168 MW are operating as "merchant power plants" that have signed a series of 90- to 180-day contracts with DWR

and are receiving energy payments in the 5 to 6 cent/kWh range. At those prices, and no payments for the capacity they provide, these facilities cannot afford any new capital investments and will be closing down over time if they do not receive any additional subsidy. The remaining 512 MW of biomass capacity are now operating under five-year long-term power purchase contracts with utilities and are being paid 5.37 cents/kWh for their energy they deliver. However, the prices paid for energy are based on time-of-use. Many cannot afford to operate during off-peak hours because energy prices are too low at those times of the day.

"This is a very frustrating time for the biomass power industry in California," said Phil Reese, chairman of the California Biomass Energy Alliance. "We are not in good shape. There is little or no possibility of any new biomass power plants ever coming on-line in California," said Reese. A series of delays on approving SB 530, which includes funding for existing renewable energy facilities, has created great uncertainty within the ranks of biomass power plants. If this legislation does not pass, many additional biomass power plants will go under.

"Once a biomass power plant shuts down, it is very difficult to get them back on-line," pointed out Reese. Once the plant closes, the fuel supply infrastructure disappears. On top of that, once a plant is mothballed, it typically costs too much money to bring the facility back into working condition. Many air quality management districts worry that if additional biomass power plants shut down, air quality in places such as San Joaquin County will deteriorate significantly due to increased open field burning of agricultural wastes.

## PUBLIC POLICY CHALLENGES

### Biennial Resource Plan Update: The Beginning of the End

The episode that best epitomizes what went wrong in California is the story of the bureaucratic nightmare known as the Biennial Resource Plan Update or the BRPU. This planning process for new power plants featured the most complex analysis of the environmental impacts in the US. Proceedings to develop this “biennial” auction for new power supply began in 1988. It required the state’s three investor-owned utilities to add 1,358 MW of new power to their systems. Each utility had to calculate what it would cost for it to build various power plants the CPUC deemed to be the least expensive, then private developers would bid against these utility proxies.

The results of this auction shocked everyone. Independent energy producers submitted bids whose prices were 17 to 44 percent below what utilities said

it would cost to build new fossil fuel power plants<sup>32</sup>. The BRPU sparked intense competition among wind companies; they offered the lowest prices ever for renewable energy in the U.S. “The most interesting thing to come out of the BRPU was the simple fact that every single bid in the Southern California Edison service territory -- even the wind power bids -- beat Edison’s proposed natural gas plant repowering,” said Jan Smutny-Jones, executive director of Independent Energy Producers. “If you told me that a year before, I would have told you were crazy. But that’s a fact,” According to Smutny-Jones’s math, rate payers in Edison’s service territory would have saved \$500 million thanks to BRPU

projects<sup>33</sup>. Livermore-based Kenetech, the nation’s largest wind developer at the time, would have built many of the wind projects.

After a series of bureaucratic turf battles and procedural delays, the BRPU bid winners were approved by the CPUC in December 1995. But Southern California Edison took the unusual step of appealing the CPUC decision to the Federal Energy Regulatory Commission’s (FERC). FERC shocked California’s renewable energy community in the

summer of 1995 by overturning the CPUC decision to proceed with the BRPU projects. FERC rarely interfered in matters of state-regulated power procurements. But the federal agency stepped in and ruled the BRPU violated provisions of the

*“The most interesting thing to come out of the BRPU was the simple fact that every single bid in the Southern California Edison service territory -- even the wind power bids -- beat Edison’s proposed natural gas plant repowering.”*

Jan Smutny-Jones  
Independent Energy Producers

PURPA, the law passed in 1978 that mandated that electric utilities buy power from independent power producers at “avoided cost.” The reasoning behind the reversal revolved around the use of environmental costs in determining the bid winners.

The BRPU was an energy auction that was widely praised for providing low-cost and clean power by renewable energy advocates and environmentalists. But it was routinely criticized by utilities, particularly Southern California Edison and San Diego Gas & Electric, because it locked them into long-term power purchase commitments at a time when de-regulation reforms promised greater flexibility in resource procurement involving short-term transactions.

## **Restructuring California's Power Market**

**T**he low cost bids submitted in the BRPU caught the attention of California's businesses, especially those who consumed massive amounts of electricity. Large cement kilns, the state's last steel mill, and other large electricity users petitioned the CPUC to be able to shop for power. The state's electricity rates were reportedly 50 percent higher than neighboring states.

Beginning in 1994, the California Public Utilities Commission began a long, tortured debate over how best to restructure the state's \$23 billion power market. It came up with a plan in December of 1995, issuing the landmark "Blue Book" decision, which began the trend toward deregulated power markets in the U.S. The California legislature took over and unanimously passed AB 1890 at the end of the legislative session in 1996. The end result: customers of the state's private utilities could begin shopping for power on April Fools Day 1997.

The virtues of a "free" market -- and allowing customers to choose their electricity suppliers -- would be tested in California, the state that had been on the forefront of designing progressive energy policies since the '70s. Since polls showed 60 to 70 percent of consumers across the country preferred renewable energy, and about 20 to 25 percent were willing to pay extra for it, California would be a major test to see whether these impressive numbers could be translated into market outcomes<sup>34</sup>.

The results were a disaster for the state's renewable energy industry. Though virtually all of the residential customers in California who did switch switched to a green power product, less than 2 percent of the state's total customer base switched to any power company.

AB1890 also established the Public Goods Charge, a small fee paid by all customers that supported low-income programs, energy efficiency and renewable energy. The renewables portion, adding up to \$540 million over four years, was to support existing

generators, new projects, emerging technologies such as solar PV and fuel cells, and provide a market incentive, in the form of customer rebates, for green power marketers<sup>35</sup>.

The New Renewables account was designed to give out about \$40 million per year in subsidies through a "reverse auction" approach. Developers would bid their projects to the California Energy Commission. Those that required the lowest subsidy would be awarded state funds. The level of state subsidy bidders requested averaged 1.2 cents/kWh in the first auction, .59 cents/kWh in the second, and .75 cents/kWh in the third<sup>36</sup>. This signaled that renewables were becoming increasingly cost effective and could continue to thrive in a competitive market. The catch was that winning the auction did not guarantee a contract to sell the power. Without a power purchase contract, a developer cannot proceed, regardless of the availability of state subsidies. Renewable power plant developers faced the same market uncertainty that conventional power plant developers faced. Without a buyer, their projects could not be developed, no matter how competitive. When the power crisis of 2000-01 hit, most projects ground to a halt.

As a result, less than 15 percent of the new projects awarded funds have been built. The funds in the New Renewables account are largely unclaimed, waiting for their projects to be built<sup>37</sup>. Dozens of cost-effective renewable energy projects are on the drawing boards, ready to go. The CPA, for example, received bids for 1,956 MW of new renewables projects, the vast majority of them from new wind farms that proposed to come on-line this year. The average price was 4.6 cents/kWh<sup>38</sup>.

Problems with the Public Goods Charge process show that while public funding is helpful, the most important thing for renewables is to have a buyer and a stable market. While SB 90 of 2001 extended these funds for another 10 years, much of the anticipated

growth in demand for electricity has been met by long-term contracts signed by the Department of Water Resources (DWR). The proposed RPS (SB 1524) takes a different tack, doubling the state's commitment to renewables by emphasizing market pull over financial push.

As renewable energy projects surpassed 10 years of operation, many were in a state of decline and decay. Most generators had signed contracts that locked in the market rate for ten years at the time they were signed. In the late 1980s, market rates were as high as 11 and 12 cents per kWh. By the time the fixed-price period ended in the late 1990s, market prices had fallen to only 2 or 3 cents per kWh, driving some renewable companies out of business. About \$240

million of the AB 1890 funds paid out over four years are dedicated to keeping these existing renewable energy facilities alive. The whole premise of AB 1890, however, was that there would be a functioning market for electricity in California. That assumption was clearly proved to be wrong beginning in the fall of 2000, when wholesale prices started going through the roof.

One of the supreme ironies for the renewables industry is that during the record high prices of late 2000 and early 2001, the renewable energy projects built in the 1980s—bemoaned by utilities as too expensive—were suddenly the cheapest alternatives in the system, besides large hydropower<sup>39</sup>.

## **From “Competition” to State Government Control**

With utilities pushed into bankruptcy, retail rates soaring, and a new breed of sophisticated power merchants shamelessly gaming the market, Gov. Davis shifted away from a “competitive” but clearly dysfunctional power market. Governor Davis thrust the state Department of Water Resources (DWR) into the role of becoming the sole purchasing agent of electricity for most Californians. At a time when natural gas prices were at an all-time high, DWR signed up gas-fired power plants whose power purchase terms stretched out for as long as 20 years.

The average cost of these fossil fuel power supply contracts was roughly 7 cents per kWh, according to DWR<sup>40</sup>. A State Auditor's analysis of the power purchase contracts discovered a number of shortcomings in these contracts: a lack of penalties if generators do not deliver electricity during periods of high demand; generators can pass through fuel costs to consumers; the state bought more power than is needed in southern California between 2003 and 2005<sup>41</sup>.

The contracts were signed at the peak of the market, but they were for much less than the current spot

prices at the time. They probably did “help tame the market” as David Freeman, who helped negotiate the contracts on behalf of the Davis administration, has said. And California is still in the process of pressuring power companies to renegotiate the contracts and has appealed to FERC for help. Yet the high prices DWR is paying for fossil fuel facilities illustrates that integrating fixed price, lower cost renewables would have been a more balanced approach to solving California's supply shortage.

Interestingly enough, wind power supply contracts have been rumored to be in the 3 cent/kWh range when the federal production tax credit of 1.7 cents/kWh is factored into the pricing<sup>42</sup>. In an all-source solicitation in Colorado, state regulators ruled that specific wind projects were the cheapest generation option available to be built last year<sup>43</sup>. This past spring, wind power prices were so low for wind farms at sites in northern Iowa that Interstate Power & Light, a subsidiary of Alliant Energy, doubled its purchases of wind power. “These were the most competitive bids we could possibly get and we wanted to move quickly while we had those bids in hand,” said an Alliant spokesman<sup>44</sup>.

But in the extremely volatile and uncertain power market that California has been experiencing, investors are also cautious about sinking large long-term investments into wind or other renewable energy sources. Natural gas turbines, with their relatively low capital cost but high operating costs, reduce the risk of up-front investments, but are subject to the whims of natural gas fuel prices. Renewables, like wind and geothermal, are the opposite: they have high capital costs and low operating costs. They can produce power more cheaply than gas-fired generators during times of price volatility, but since they lock investors in up-front, they are still often viewed as the riskier investment.

The more renewable energy resources that feed their electricity into the grid, the less demand there is for

natural gas fuel, which then reduces natural gas and electricity prices for all consumers. Dampening the demand for natural gas also helps increase energy security by reducing dependence on out of state natural gas suppliers and fossil fuel electricity generators.

The other advantage of adding more renewable supply instead of natural gas in California is the superior economic development benefits of clean power technologies. According to a report released by the California Public Interest Research Group (CALPIRG) Charitable Trust, doubling the state's reliance upon renewable energy would create 28,000 year-long construction jobs and 3,000 permanent operating jobs – four times more than a similar amount of gas-fired power plants.<sup>45</sup>

## Is There Enough Natural Gas To Supply California?

A report released by Santa Monica-based RAND Corporation notes that California's consumption of natural gas could double between 2000 and 2010, largely due to the construction of new gas-fired power plants.<sup>46</sup> "This increased demand for natural gas will place a burden on an already constrained pipeline system that serves California and the other western states," reads the report. Though the report maintains there are sufficient natural gas resources to meet growth in demand in California, it notes the state will have to compete with neighboring states for those resources and that interstate pipeline expansions may lag behind expected demand growth. It also claims that receipt and storage capacity in California are inadequate to meet the increasing demand. All of these factors combined "create a risk to California of volatile and rising natural gas prices and recurring supply problems."

The RAND report calls for an increase in energy efficiency, renewables, and gas pipeline and storage infrastructure to reduce the risk.

An even more alarming scenario is painted in a recent report authored by Rich Ferguson of the Center for Energy Efficiency and Renewable Technologies (CEERT). Like the RAND report, Ferguson argues that the prudent solution to

California's power supply is to add significant new renewable energy facilities to its power plant portfolio.

According to Ferguson, the only three options available to fuel all of the natural gas-fired power plants planned in California and the rest of the US are: to build a pipeline to the Arctic; deepwater production in the Gulf of Mexico; and to develop the infrastructure to import liquefied natural gas from other countries. Ferguson maintains that each of these three scenarios are viable only if natural gas prices rise 50 percent above cost estimates rendered by the US Energy Information Administration. "If 20 percent of the electricity in the US were to be generated from renewable energy sources by 2020, the 6 trillion cubic feet of additional natural gas expected to be burned every year to generate electricity could be avoided," said Ferguson<sup>47</sup>.



## **Global Climate Change Drives Global Wind and Solar Markets**

**D**eep concerns about emissions from fossil fueled power plants contributing to global climate change have created a political climate in Europe that is very supportive of renewable energy, particularly wind power and solar photovoltaics (PV).

The European Union has ratified the Kyoto Protocol.<sup>48</sup> The European Climate Change Programme (ECCP) is designed to help meet the Kyoto target of reducing greenhouse gas emissions 8 percent below 1990 levels by 2008-2012. Among the first steps authorized under this effort to achieve the Kyoto emission reduction targets is to meet 12 percent of the gross inland energy consumption of the EU member countries with renewable energy supply by 2010<sup>49</sup>.

In response to these targets, and the declining cost of renewable technologies, the wind power market in Europe has expanded by about 40 percent in each of the last six years. The European Wind Energy Association (EWEA) recently increased its goal of installing 40,000 MW of wind power by 2010 to a new goal of 60,000 MW<sup>50</sup>. By 2020, the goal of EWEA is 150,000 MW. The bulk of new European installations are in Germany, Denmark, and Spain.

In terms of total capacity, Germany, which has very modest winds, is the global leader on total wind power capacity installed, adding 2,600 MW of new wind turbines last year.

As of December 2001, Germany had installed 8,750 MW. Germany only had 200 MW of wind in 1992. In less than ten years, Germany added enough wind power to employ 35,000 people and supply more than five times as much wind energy capacity as was on-line in California in 1992<sup>51</sup>. Germany has a number of generous financial incentives for clean power development, including an aggressive “feed-in” tariff that promises high payments to wind developers, taxes on energy sources pegged to carbon content, and net metering<sup>52</sup>. Due to these policies, the German PV industry, the most advanced in Europe, is

projected to grow from its current installed capacity of 113 MW to 438 MW by 2004<sup>53</sup>.

Denmark, with 2,300 MW, depends upon wind power to meet over 15 percent of its current electricity supply needs, more than any other nation in the world. As noted earlier, Denmark evolved into the world’s primary supplier of wind turbine technology by taking advantage of California’s incentives for wind farm development. California was its initial export market. But the small nation has, until this year, stuck to it and now dominates export markets to the US and elsewhere.

Denmark has already exceeded its national goal of producing 20 percent of its electricity from renewables by 2003. At present, 27 percent of its power comes from renewable energy sources<sup>54</sup>. However, a new conservative government is scaling back long-standing subsidies that have been in place for 20 years. Denmark’s about face on wind and renewables could present a market opportunity for the US and for other European nations.

The third major European leader in wind power is Spain, which had 3,337 MW installed at the end of 2001. Spain has established an RPS-like goal of obtaining 12 percent of its electricity from renewables by 2010<sup>55</sup>.

The United Kingdom has the best the wind resource in Europe, and development is picking up there due to a new RPS-like policy that replaces a bidding system similar to the California Energy Commission’s reverse auction. A fresh review of energy policies by the government in the UK now predicts that 20 percent of the nation’s electricity will come from renewables by 2020. This new goal supersedes a previous goal of 10 percent by 2010<sup>56</sup>. “This obligation is the corner-stone to our policy to unlock the door to green energy in this country,” said Brian Wilson, UK energy minister. “We are pursuing a market-led approach to encourage competition amongst different

technologies. This will keep costs down, making it a good deal for industry as well as the environment.<sup>57</sup>

Japan is the other global leader on renewables such as solar PV technologies. Japanese manufacturers, led by Sharp, produce 43 percent of the world's solar PV

capacity. Japan led the global market in 2001 by installing 100 MW of grid-connected systems<sup>58</sup>.

Germany came in second with 75 MW. The US was a distant third with 32 MW.

## THE ROAD AHEAD

California, once a world leader on renewable energy, has seen its lead slowly disappear through years of neglect, bureaucratic infighting, political posturing, as well as misguided policies.

"California has no vision for the future," commented Carl Weinberg, former manager of PG&E Research and Development and current president of Walnut Creek-based Weinberg Associates. "There hasn't been any integrated resource planning in this state since the BRPU more than 8 years ago. California really needs to look at retail markets because it looks like wholesale markets will largely be governed by FERC. Renewable energy supplies can stabilize prices. We just need to decide who will manage our power supply portfolio," said Weinberg.

He concluded, "We have learned that markets don't take care of everything. We need to take a fresh look at our whole governance structure. Right now, we have too many cooks in the kitchen, and they are not even serving up the same dinner! The new clean power technologies have made tremendous progress. But our regulatory structure and markets need to catch up so that California does become a leader again."

A Renewable Portfolio Standard (RPS) may offer part of the solution to the price volatility, environmental impacts and economic drain of the state's current substantial commitment to traditional fossil fuel technologies. An RPS would require retailers of electricity to increase the amount of renewable energy in California's power mix from 10 to 20 percent by 2015. The RPS could create a long-term stable market

for the very renewable energy technologies that put California on the energy map decades ago.

The Union of Concerned Scientists found that a 20 percent RPS would boost wind power from less than 1.5 percent of the state's total electricity mix to 6.1 percent. Geothermal generation would grow from less than 5 percent today to over 10 percent<sup>59</sup>.

California has more than 7,000 MW of new wind power potential, 1,000 MW of untapped geothermal steam, 700 MW of biomass and 700 MW of solar PV, according to a report published by the Renewable Energy Policy Project<sup>60</sup>. Another report by Clean Edge estimated 1,400 MW of solar PV could come on-line within 7 years if new state financing proposals were adopted<sup>61</sup>.

In the mid-70s, California was dependent upon fossil fuels to supply 80 percent of the state's electricity<sup>62</sup>. That dependence upon a finite and polluting source of electricity was dramatically reduced in the '80s by the emergence of independent clean power producers responding to a clear policy preference for renewable energy in California.

In the 1980s, California brought on line 90 percent of the world's solar, wind, geothermal and biomass power. The state has counted on these renewable energy sources for more than 10 percent of its electricity for over 15 years. Today, these are the most valuable power plants in California because their costs are stable—they do not increase when fossil fuel prices do—and because they do not exacerbate California's serious air quality problems.



"The renewable energy industry, particularly wind power, is thriving all over the country," commented V. John White, executive director of the Center for Energy Efficiency and Renewable Technologies (CEERT). "California, the state with a reputation for pushing renewable energy, is languishing, caught in the cross-fire between utilities focused on short-term costs and state agencies with great plans, but little real action to show for their efforts."

White went on to say that California has made some progress, particularly in addressing barriers in the management of transmission and the scheduling of variable resources such as wind. Indeed, it is these scheduling issues that White speculated likely dissuaded DWR from signing up more wind power

last year. "Renewable energy resources have been ready to go twice, first in the mid-90s with the BRPU, and then again in the last two years with the California Energy Commission and the California Power Authority solicitations. Real, viable projects are still ready to go, but we have no customers," said White. Yet he remains optimistic. "California may have lost the lead, but we are poised for a recovery. We can come back. Our Governor, like many other state legislators, has been pre-occupied by the pressing financial aspects of the recent energy crunch. He may be guilty of rhetorical excesses and insufficient action at this point in time. But I still see opportunity to move beyond stalemate and for our elected officials to lay the foundation for a renewable energy renaissance."

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<sup>1</sup> JA Savage, "Power Authority Points to Single-Power Agency Role; Claims It Can Leverage \$17 Billion in State Funds," *California Energy Markets*, January 25, 2002, p. 12

<sup>2</sup> Dora Yen, Juan Guzman and Awad Nasim, *Wind Performance Report Summary, 1996-1999*, California Energy Commission, Sacramento, CA October, 2001, Figure 5.3.

<sup>3</sup> Ed Mendel, "Renewable Energy Fades From Picture in Rush For Solution," *San Diego Union-Tribune*, July 4, 2001, p. A1.

<sup>4</sup> Though the global wind power market has grown at a 30 percent or more pace over the last several years, total global wind power capacity is still dwarfed by total global fossil fuel and nuclear power capacity.

<sup>5</sup> Arthur O' Donnell, "Wind Power the Big Winner in CEC New Renewables Funding," *California Energy Markets*, December 22, 2000, p. 6.

<sup>6</sup> California Energy Commission, [http://www.energy.ca.gov/renewables/new\\_renewables.html](http://www.energy.ca.gov/renewables/new_renewables.html); phone interview with Marwan Masri, manager of the renewable energy program for the California Energy Commission.

<sup>7</sup> Interview with Steve Ponder, FPL Energy's Director of Regulatory Affairs, West Coast.

<sup>8</sup> Elizabeth McCarthy, "Incentive Funding for Enron Wind May Soon Blow Away," *California Energy Markets*, April 5, 2002, p. 8.

<sup>9</sup> Interview with Ed Maddox, Assistant Vice President, SeaWest.

<sup>10</sup> Summary of State Renewable Energy Policies (as of May 2002), [www.ucsusa.org/energy/renewpol.pdf](http://www.ucsusa.org/energy/renewpol.pdf)

<sup>11</sup> "TEXU, Cielo To Build 240 MW Texas Wind Power Plant," *Reuters*, July 26, 2002.

<sup>12</sup> Richard Perez-Pena, "Governor's Task Force Is Divided on Plans to Reduce Greenhouse Gases," *New York Times*, June 12, 2002.

<sup>13</sup> The flaws inherent in an investment tax credit have persuaded policy makers to switch to a production tax credit for wind and other renewables. Whereas an investment tax credit is pegged to capital costs, the production tax credit is based on actual amounts of electricity generated by wind projects.

<sup>14</sup> Thomas Starrs, "Legislative Incentives and Energy Technologies," *Ecological Law Quarterly*, Vol. 15, 1988, pp. 103-118.

<sup>15</sup> Dora Yen et al, *Wind Performance Report Summary, 1996-1999*, California Energy Commission, Sacramento, CA October 2001.

<sup>16</sup> <http://www.ewea.org/src/europe.htm>

<sup>17</sup> *Wind Energy Outlook 2002*, American Wind Energy Association, [www.awea.org](http://www.awea.org).

<sup>18</sup> Interview with Suzanne Korosec, Manager, California Energy Commission's New Renewables Account.

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- <sup>19</sup> For near-term Texas wind power capacity see: <http://www.awea.org/projects/texas.html>; for a listing of the 697 MW of new wind power supply proposed, but which may never be installed in California, see: <http://www.awea.org/projects/california.html>.
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